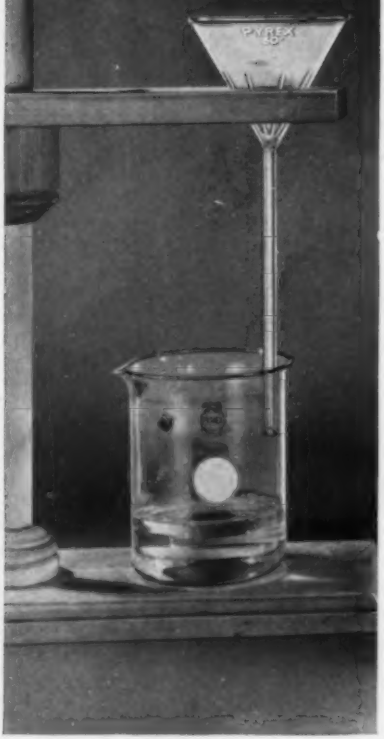
The CHEMIST

NOVEMBER, 1942 VOL. XIX, No. 8

MARSTON TAYLOR BOGERT

"PYREX" BRAND Accurate 60° Fluted Funnels

Match Today's *War Time Tempo*



Unequalled for speed and economy, "Pyrex" Accurate 60° Fluted Funnels fit perfectly into today's accelerated laboratory work.

These precision-shaped fluted funnels practically *double* the effective filtering area—and hence the speed—of ordinary funnels. Their accurate 60° angle was deliberately chosen by Corning Research as the angle permitting a close paper fit over the entire supporting area with less tendency to tear. Fire-polished bead and tip and heavy wall stem add to the mechanical strength of the "Balanced Glass" construction—assure longer service at a time when durability is a premium quality.

Available both fluted and plain, "Pyrex" 60° Funnels are stocked by your regular laboratory supply dealer.

See Our Exhibit
1942 NATIONAL CHEMICAL EXPOSITION
SHERMAN HOTEL CHICAGO
SPACE 169

PYREX BRAND **LABORATORY WARE**
"PYREX" and "VYCOR" are registered trade-marks and indicate manufacture by
CORNING GLASS WORKS • CORNING, NEW YORK

PYREX T.M. REG. U.S. PAT. OFF.

CORNING *means* Research in Glass

VYCOR TRADE MARK REG. U.S. PAT. OFF.

Production on the Wing!

Throughout the nation production is soaring. But it must move still faster. Wartime demands, in ever-increasing volume, are pouring in upon manufacturers.

Every day, chemists and production executives engaged in new fields of work are faced with new problems. Every day, their need for tonnage chemicals of exacting specifications is more urgent. To these men, Baker offers assistance. We, too, have enlarged our facilities and you can get tonnage chemicals of unusual purity from Baker.

You can rely upon Baker as a reliable source of chemical supply. The combined knowledge of Baker's Technical, Executive and Manufacturing Staffs is at your service to help you meet any wartime problem.

In the nation's leading laboratories, Baker's Analyzed C.P. Chemicals and Acids continue to be used to determine the *qualities* and properties of countless products.

The actual analysis on the Baker label allows chemists to chart their courses for ***known,*** rather than unknown, percentages of impurities. It helps speed production.

More than 60 leading Laboratory Supply Houses distribute Baker's Analyzed C.P. Chemicals and Acids. Order from your favorite supplier.

J. T. BAKER CHEMICAL CO.

PHILLIPSBURG, NEW JERSEY

NEW YORK 420 Lexington Ave. | PHILADELPHIA 220 South 16th St. | CHICAGO 435 N. Michigan Ave.

BAKER'S ANALYZED C. P. CHEMICALS ARE SOLD BY THESE REPRESENTATIVE LABORATORY SUPPLY HOUSES

STRATEGIC MATERIALS
In Hemisphere Defense

By M. S. Hessel
W. J. Murphy, F.A.I.C.
and F. A. Hessel

Every one of us uses and depends on supplies of essential materials. The war has brought home to Americans, for the first time, our ignorance and lack of preparation. While newspapers and periodicals told us the facts, dullness of statistics prevented our comprehending their importance.

STRATEGIC MATERIALS IN HEMISPHERE DEFENSE makes clear the complex story of supply. In it are discussed the fourteen strategic and fifteen critical materials on the Army's list, their sources, potential sources, their uses and our needs. Pictographic diagrams have been used to translate the figures into visual comparisons.

The rise in war production from 150 millions of dollars to 3,500 millions between June 1940 and May 1942 is not enough for victory. Only by knowing the facts can we prepare. Here is a book which tells the true situation.

A Partial Check of Contents

Steel, rubber and tin, synthetic rubber, aluminum, asbestos, mercury, antimony, mica, quartz, toluol, textiles, leather, opium, iodine, cinchona, cork, kapok, jute, manila, sisal, fats, oils, gums. The supplies from South America. The shortages in the midst of plenty, copper, lead, zinc, petroleum, chemicals.

256 pp. 5⅜"x8", with many diagrammatic illustrations . . . $2.50

Copies may be obtained from THE CHEMIST

The CHEMIST

Publication of
THE AMERICAN INSTITUTE OF CHEMISTS, INC.
V. F. KIMBALL, *Editor*, 233 Broadway, New York City
VOLUME XIX NOVEMBER, 1942 NUMBER 8

Editor

V. F. Kimball, 233 Broadway, New York, New York.

Editorial Advisory Board

Walter J. Murphy, Chairman

Hilton Ira Jones **Howard S. Neiman**

Contributing Editors

A. M. Buswell, State Water Survey Division, Urbana, Illinois.
R. K. Carleton, Rhode Island State College, Kingston, Rhode Island.
Leo M. Christensen, Chemurgy Project, The University of Nebraska, Lincoln, Nebraska.
T. K. Cleveland, Philadelphia Quartz Company, Berkeley, California.
George H. Coleman, The State University of Iowa, Iowa City, Iowa.
Ralph T. K. Cornwell, Sylvania Industrial Corporation, Fredericksburg, Virginia.
M. R. Everett, The University of Oklahoma, Oklahoma City, Oklahoma.
J. B. Ficklen, 727 South Oakland Avenue, Pasadena, California.
Minnie A. Graham, Queens College, Charlotte, North Carolina.
M. Gertrude Harvey, Bradley Polytechnic Institute, Peoria, Illinois.
J. H. Jensen, Northern State Teachers College, Aberdeen, South Dakota.
Louise Kelley, Goucher College, Baltimore, Maryland.
J. M. Kniseley, Laucks Laboratories, Inc., Seattle, Washington.
Stewart J. Lloyd, University of Alabama, University, Alabama.
Lena Martin, Georgia State College, Milledgeville, Georgia.
Simon Mendelsohn, 765 Greenwood Avenue, Cincinnati, Ohio.
Willard L. Morgan, Arnold, Hoffman and Company, Inc., Providence, Rhode Island.
M. Starr Nichols, Regents University of Wisconsin, State Laboratory of Hygiene, Madison, Wisconsin.

THE AMERICAN INSTITUTE OF CHEMISTS
HOWARD S. NEIMAN, *Secretary*
233 Broadway
New York, N. Y.

Entered as second class matter April 8, 1936, at the Post Office at New York, N. Y., under Act of August 24, 1912.
Issued monthly except in June, July and August at 233 Broadway, New York, N. Y.
Subscription price, $2.00 a year. Single copy, this issue $0.25
Copyright, 1942, by The American Institute of Chemists, Inc.

CONTRIBUTING EDITORS (Continued)

William B. O'Brien, The Dodge Chemical Company, 656 Beacon Street, Boston, Massachusetts.

Harry S. Owens, Department of Chemistry and Chemical Engineering, University of Idaho, Moscow, Idaho.

Ivy M. Parker, 4741 Pease Ave., Houston, Texas.

W. B. Parks, 105 West Potlitzer, Pittsburg, Kansas.

J. M. Purdy, The Lowe Brothers Company, Dayton, Ohio.

Ashley Robey, P. O. Box 96, State College, Arkansas.

Milton O. Schur, Brown Company, Berlin, New Hampshire.

Kenneth A. Shull, 2437 Bryn Mawr Avenue, Ardmore, Pennsylvania.

Alexander J. Stirton, Color and Farm Waste Division, U. S. Department of Agriculture, Washington, D. C.

Margaret C. Swisher, University of Buffalo, Buffalo, New York.

Harold H. Tucker, 4739 N. Woodburn Street, Milwaukee, Wisconsin.

IN THIS ISSUE

	Page
Combat Chemists. By Gustav Egloff, F.A.I.C.	261
The American Institute of Chemists Endorses Amendment to Manpower Bill	262
Gustav Egloff. By Robert J. Moore, F.A.I.C.	263
Gustav Egloff—Petroleum Technologist. By George A. Burrell, F.A.I.C.	265
The Influence of Egloff on the Progress of American Chemistry. By Marston T. Bogert, F.A.I.C.	270
Wartime Chemicals from Natural Gas. By Gustav Egloff, F.A.I.C.	278
Council	293
Meeting Dates	296
Chapters	297

President Gustav Egloff at work in his laboratory

Combat Chemists

IN THIS global war the chemist is on the combat line just as the soldiers and sailors at the front. He combats the manifold problems encountered by the fighting man and he should be in the front line trenches meeting the actual chemistry of the battlefronts. In a large percentage of war work the chemist plays a leading rôle. There is scarcely a phase of war activity in which the chemist does not play an indispensable rôle. He has always been a modest, though important worker. He is still modest, but his deeds in the war effort speak for themselves with tones that cannot be ignored.

The chemist's remarkable achievements in this war merit recognition that should place him in the same professional standing and legal status in the public eye as are enjoyed by the physician, the lawyer, the public accountant, the engineer, and others.

This status will be reached most effectively through the coöperation of all chemists as members of THE AMERICAN INSTITUTE OF CHEMISTS.

Gustav Egloff

The American Institute of Chemists Endorses Amendment to Manpower Bill

THE following telegram was sent by President Egloff to Senator Robert A. Taft endorsing his plan for an amendment to the Manpower Bill to ensure a supply of scientifically trained persons for the War effort:

WESTERN UNION TELEGRAM

November 6, 1942

Senator Robert A. Taft,
Senate Office Building,
Washington, D. C.

Heartily agree with your proposed amendment to Manpower Bill to insure adequate supply of scientifically and technically trained men and women. Suggest three steps in this direction. First, do not draft any scientists or technologists. Retain chemists, chemical engineers and other scientifically trained persons in present wartime production jobs. Second, continue to graduation education of scientific and technical students both men and women. Third, encourage more women to study sciences to fit them for technical war jobs. I estimate 75,000 to 100,000 graduate chemists and chemical engineers in United States. War plants already operating, under construction or planned to produce war materials such as aviation gasoline, rubber and explosives and many other war efforts will require at least double this number, not to mention other services contributing to the war effort such as technical branches of army and navy. As director of research of Universal Oil Products Company, I am personally concerned at developing serious shortage of technically trained men and women.

Dr. Gustav Egloff, President.

THE AMERICAN INSTITUTE OF CHEMISTS.

Gustav Egloff

Introductory Remarks at the Testimonial Dinner to Dr. Egloff at The Chemists' Club, New York, N. Y., October 23, 1942.

***By* Robert J. Moore, F.A.I.C.**

The Bakelite Corporation, Bloomfield, N. J.

ON NOVEMBER 10, 1886, there occurred a far-reaching, but little publicized event in New York City—one that has long remained a secret—but is divulged here tonight. For on that date there was born to Mr. and Mrs. Egloff, a couple of Swiss origin, what was recorded as, "A son: Gustav." Our research activities—a clever bit of detective work and deduction—enable us to announce that as a matter of fact, five sons were born—quintuplets—all duplicates. There was no radio fanfare in those days and the "quints", five boys, grew up but were never seen together. All were called Gustav and each became an expert in his field. That, ladies and gentlemen, explains much that has caused us to wonder about the prodigious energies and capacity for work of our honored guest.

It explains why at Cornell University from 1909 to 1912, Gustav Egloff was president of the Liberal Club; G. E. was editor of the paper; G. E. was campus reporter to New York dailies; G. E. was a literary connoisseur and close friend of many of the well-known writers of his day, Edwin Markham, the Coryelles, etc., Michael Monahan, that delightful philosopher and essayist, you may remember as the editor of "Papyrus," and later, the "Phoenix Literary Magazine," dedicated his, "Palms of Papyrus," to Gustav Egloff, with the inscription: "To Gus Egloff: One of the best friends a poor publisher ever had!" Another G. E. was the athletic one—he, earlier, had won the 1903 Century Bicycle Race, famous for its 100 miles' length. At Cornell he became Intercollegiate Wrestling Champion at 125 pounds. It was G. E. who also became the honor student,

graduating with an A.B. and winning the Barnard Research Fellowship in graduate chemistry at Columbia! And at Columbia, one of them became the first curator of the Chandler Museum; one was the catalyst of the graduate chemists' Marching, Seidel and Discussion Club. What a Club! Calvert-Rittman-Leslie-Buswell-Dewey, Jr., and your present historian—among others. Gustav Egloff received the M.A. in 1914 and Ph.D. in 1916 at Columbia (One of them must have spent his full time alone that year counting drop-weights under Professor Morgan).

There were five brothers once in Frankfort who made economic history in Europe: There must be five Egloffs who are making scientific history today! Since 1917 they have been directing research for the Universal Oil Products Company; wherever oil is known or chemical literature is read, the name Egloff is familiar. For one G. E. has specialized on petroleum research, and through his three hundred-odd patents, has built the basic structure of a tremendous industry. One of them has concentrated his efforts on the literature of petroleum in which field he is the recognized leading authority. Consider his scientific contributions to the chemical and petroleum journals alone, amounting to 500 separate papers; his monumental reference work on "The Physical Constants of Hydrocarbons"—two volumes of which have appeared and the remaining three volumes to be released in 1943, 1944 and 1945, respectively. Other publications of fundamental interest to the chemical industry are: "Thermal Reactions of Pure Hydrocarbons"—The American Chemical Society Monograph of 1937; "Catalysis"—1940; "Emulsions and Foams"—1941; "Isomerization of the Pure Hydrocarbons," published in July, 1942, and dedicated to Professor Marston Taylor Bogert.

Edited: Annual Survey of "The Cracking Art," 1927-1939.

Several other volumes are to appear on "Motor Fuels" and "Petroleum."

Another one of the Gustav Egloffs spends much of his time before Senate, House and State Investigating Committees; has given hundreds of lectures before universities, Chemical Society Sections, and other scientific bodies. This one is known throughout the world, having lectured before and chairmanned petroleum Congresses in London, Rome, Tokyo, Berlin, Paris, and Glasgow. Many honors have been conferred upon Egloff—the Honorary Doctor of Science by Polytechnic Institute of Brooklyn in 1938; the Honorary D.Sc.,

Armour Institute of Technology in 1940; the Octave Chanute Medal of the Western Society of Engineers in 1939, and the Gold Medal of THE AMERICAN INSTITUTE OF CHEMISTS in 1940, etc. Egloff, and I speak of them inclusively, was one of the first to be termed "Modern Pioneers" by the National Association of Manufacturers in 1940, and is the first honorary member to be elected by the Colombia (South American) Chemical Society.

I believe no honor has pleased him quite so much as his election to the Presidency of THE AMERICAN INSTITUTE OF CHEMISTS. Those of us who have been hard driven by him these first few months of his office know that all five of them are acting with the combined fervor of each, as President. The formation, in two months, of the very active Chicago Chapter is but one instance of their driving force.

Egloff: To know him is to know every phase of intelligent life. And he who has Gustav Egloff for a friend has a legion on his side.

Dr. Gustav Egloff ss
Petroleum Technologist

***By* George A. Burrell,* F.A.I.C.**

I HAD difficulty in listing Gustav Egloff's achievements in the Petroleum Industry — there are so many.

You know something of his activities on the lecture platform; his technical studies and articles; his work on numerous committees; his patent work; the fact that time after time he has served at international congresses in foreign lands; and the volumes on petroleum hydrocarbons, their reactions and properties, that have been coming off the press through the years, and at accelerated pace during the past year.

Particularly, there are 250 patents and 450 publications to his credit. He has served as a delegate to eleven international congresses, is a

*President of Atlantic States Gas Company of New York, Inc., New York, N. Y.
President of Burrell Technical Supply Company, Pittsburgh, Pa.
President of Burrell-Mase Engineering Company, New York, N. Y.

member of the permanent council for World Petroleum Congresses; is an advisor to the Museum of Science and Art, of Chicago; served on the committee on Petroleum and Chemical Exhibits at the Chicago World's Fair; writes the yearly reviews on the cracking art for the Institute of Petroleum, London, England; is Chairman of the Science Exhibit for the International Petroleum Exposition and Congress, held yearly at Tulsa, Oklahoma; and is a member of some twenty-four societies and clubs, both here and abroad.

Books he has written include, "Earth Oil", a volume published for the World's Fair Century of Progress Committee; the following volumes, published, or in the progress of publication; "Emulsions in the Oil Industry", "Modern Motor Fuel Sources", and "Refining of Motor Fuels". In addition, he is writing a five volume work on "Physical Constants of Hydrocarbons". Volumes I, II, and III, have been completed. Volume IV will be ready in March, 1943. A recent book, "Isomerization of Pure Hydrocarbons", just came to my desk, dedicated, by the way, to Colonel Marston T. Bogert.

To this must be appended his more recent activities on the War's economic front:

Advisor to Office of Petroleum Co-ordinator, Washington, D. C.

Member of Advisory Committee of Office of Naval Procurement.

Advisor to Congressional Committee on Coal Hydrogenation and Oil Shale.

Served in an advisory capacity to France (before its fall) on aviation gasoline.

Served in an advisory capacity to the British on 100-octane aviation gasoline.

Advisor to the Bureau of Economics on oil resources and substitutes in Europe.

Appointed member of the National Research Council's Tour of Industrial Exploration of South America (1941) under the sponsorship of the United States Government.

Appointed member of the Committee on Correlation of Research for the American Institute of Mining and Metallurgical Engineers.

Appointed member of the Advisory Committee of the American Petroleum Institute on Pure Hydrocarbon Research for the years 1938-1943.

Appointed member of the Advisory Committee on Fundamental Research on the Composition and Properties of Petroleum of the American Petroleum Institute for 1942.

The American Institute of Chemical Engineers appointed Dr. Egloff a member of the joint committee on Inter-American Engineering Co-operation to act in an advisory capacity to the Inter-American Development Commission.

Appointed member of Petroleum Industry War Council, Refining Committee for District Two.

Truly an amazing record, and time has not dimmed his activities or his vision — rather enhanced them, I should say.

But of all Dr. Egloff's accomplishments, the one that I like the best, probably because I entered into it in a small way, and hence know about it rather well, is his work, with his colleagues, in making the Universal Oil Products Company the important institution it is today.

A small group of people, under Mr. H. J. Halle, the President of the company, began this company some 25 years ago. Its development has been one of the outstanding business and technical romances of our country. The story has been told in the press and magazines of the country. Discouragements were many and patent battles costly. The initial group made an investment of a moderate sum of money and a lot of brains and courage, and faith in their future, and brought their company to a point where the stock was worth $30,000,000.00 in 1930. How much it is worth today, I do not know. Certainly not less, for its usefulness has grown with the years.

The research and development laboratories of the Universal Oil Products Company, at Riverside, on the outskirts of Chicago, house one of the outstanding research organizations of the country. Here, cracking, polymerization, isomerization, hydrogenation, alkylation, high octane gasoline, treating, and kindred subjects, have for years undergone a thorough going-over, and out of them have come developments of great practical utility. There are at least 500 units scattered over the globe, which are the fruits of the work of the Universal Oil Products Company. A great contribution to the cracking art was the cracking for the first time, in 1921, on a large commercial scale, of residual petroleum stocks. You are familiar with Universal's work on the alkylation and polymerization of olefinic refinery gases to make high octane gasoline, and other chemical processes, but probably not so well acquainted with the ceaseless experimentation on a host of other matters — furnaces, reaction chambers, fractionating towers, treating methods, combinations of coil and chamber and

towers, and the like, as well, of course, as research work on the chemistry and catalysis of petroleum hydrocarbons. The Universal Oil Products Company also has a butadiene process. The latter I happen to be well acquainted with, for I personally almost had the experience of putting a unit into production, to make rubber. Furthermore, the company, along with certain other huge research organizations, has made all of its processes and patents available to the Government, to use as it sees fit, and by anybody the Government designates.

I am glad to see that Mr. H. J. Halle, the President of the company is here, to witness an additional honor that has come to the Director of Research of his company. Mr. Halle surrounded himself with such men as Dr. Egloff, C. P. Dubbs, Joseph Alther, Jack Morrell, Frank Belknap, William Hall, John Seguy, L. C. Huff, Don Bergman, and others, and they battled their company's way to its present eminent position. In later years Professor Ipatieff, noted Russian-born authority on catalysis and high pressure reactions, joined the staff. His sterling work is well known. He joined the company under the urging of Dr. Egloff. The Dubbs patent was the corner stone of the original set-up, and the elaboration of it, through intensive experimentation, is still one of the strong pillars beneath the organization. Other processes include the catalytic polymerization of propylene and butylenes, in the presence of orthophosphoric acid to form high octane gasoline. These are the famous "Poly" plants of the Universal Oil Products Company's many units which are in operation throughout the country.

It was an astonishing thing to science when paraffins and olefines were made to react, so-called alkylation phenomena, and Universal has in operation, at a number of refineries, plants for converting, in the presence of hydrogen fluoride, isobutane with butylene, propylene and pentylenes, to 100-octane gasoline. Other processes are based on catalytic isomerization, catalytic cracking, new treating methods, and the like.

This is an era of catalytic chemistry in the petroleum industry, although up to relatively recent years little progress had been made in the art.

Mr. Halle's faith in research never faltered and today he can look back over a highway of obstacles and hurdles, finally overcome, to put his company in a position to play a vital rôle in our present desperate effort to maintain our way of life.

Gustav Egloff is a person of insatiable curiosity about everything that he sees. And it needn't be petroleum. I remember his exclaiming, in

the newspapers, about a better style of house and building architecture, long before this architecture began to blossom into its present streamlined and pleasing effects. I recall long conversations with him about the economic life of our country. His interest in art and literature is more than ordinary.

But it is as a petroleum technologist, of course, that he has made his name famous, and I have no hesitancy in saying that posterity, which is always the final judge, will place him as high in petroleum matters as does the industry he serves at the present time.

Whence comes the urge that has made him what he is? Well, I don't know, and probably neither does our honored President, I should say. Who can say from whence comes the spark? That is as mysterious as the other riddles of the ages. His driving energy, his vision, his multiplicity of interests; all these made Gustav Egloff, the petroleum technologist. What frequently puts him at his desk at six o'clock in the morning? You supply the answer, I cannot. But this, I believe, I am safe in saying: Whatever line of work he had chosen; wherever he had been set down; he would have made an outstanding contribution to the advancement of whatever he undertook.

A mutual friend once said to me that he discovered a long time ago, one of the things that contributed to Gus Egloff's success; namely, that whenever he asked Gus to get him some information, Gus always furnished more than he expected. I myself recall once, during the progress of a patent suit, that an opposing attorney asked Gus to bring in everything he could find on emulsion of petroleums. This was a mistake on the attorney's part. We all sat through twenty-one days of the story of emulsions, to the attorney's utter disgust. He did not know his witness.

Gus Egloff strongly believes in the American way of life, and in such incentives as there are in this country to help persons like himself to positions of eminence and leadership in his, and other industries. He would never decry a lack of opportunity, for to such people as himself there is no lack of opportunity.

What manner of social person is Gus? Well, he is a very friendly and social being, as all of you, who know his cheery hail and friendly greeting, can testify. He has a great host of friends, and brings a cheerful atmosphere to any group he meets with. His technical work is well known, but not so well known are his helpfulness to others, his

aid to young people, and his compassion for the unfortunate.

And so, because of his important part in developing the petroleum art; his technical studies, his contributions to his company, his willingness to serve in any place he is asked, the books and articles he has published, his travels over the globe in the interest of his profession, and because his life work and success are an inspiration to a host of young men who will follow him, it is fitting that this additional honor be tendered him. I am glad that I can participate.

The Influence of Egloff on the Progress of American Chemistry

***By* Marston T. Bogert, F.A.I.C.**

Columbia University, New York, N. Y.

COLUMBIA University is honored by Dr. Egloff's record of achievement and of the eminent position he has won in his chosen profession. The small part I had in the training of our guest of honor, I shall always regard as one of the best investments I ever made, and a contribution to the progress of chemistry and of our country of which I am inordinately proud. The bread we cast upon the water in his case has been returned to us a thousandfold.

Egloff undoubtedly owes much of his inspiration to the influence of the late Professor Charles F. Chandler, for no one could attend Chandler's lectures without being deeply impressed by the example and teachings of a great personality who devoted his life to the service of his fellow man, and who never missed a chance of explaining to his students, with characteristic wit, charm and power, the unsurpassed opportunities for such service available to those following the profession of chemistry.

I cannot but marvel at Egloff's productivity represented by hundreds of scientific articles, other hundreds of patents, and a group of great reference volumes, which, in the hydrocarbon field, are worthy successors of the three volumes written by the late Marcellin Berthelot

of France, entitled "Les Carbures d'Hydrogène," published in 1901, and which covered his classic researches for the period 1851-1901.

He has been a marvelous accelerating catalyst in the rapidly growing domain of aliphatic chemistry, which bids fair to rival or perhaps surpass that of aromatic chemistry which, in the so-called "Coal Tar Era", when I was a student, was undergoing a similar development and expansion.

His influence upon the progress of chemistry has been outstanding, both in the dissemination of existing knowledge and in the discovery of new knowledge. He is a tremendously hard worker, and I believe is one of those who "make hay from the grass which grows under others' feet."

In assessing the fundamental value of his chemical activities, I would remind you that the hydrocarbons are, after all, the central steel skeletons upon which the whole vast and complicated architecture of modern organic chemistry is built, with its limitless millions of possible combinations and compounds.

I salute him also as a loyal American citizen of exceptional usefulness, particularly in the present emergency, whose time, thought, and strength, are always at the command of his Government, and which he is serving in many official positions.

For years he has been a faithful and efficient member of our American Chemical Society and has served as one of its Councilors-at-large, as well as in various other official positions. As an industrial chemist, his distinguished and recognized leadership in the field of petroleum chemistry has been ably described by Col. Burrell, another honored leader in the same field, and is not merely national, but widely international.

Since 1927, on the invitation of the Institute of Petroleum, London, he has been writing for their "Proceedings" annual reviews of the cracking art. He is adviser to the British on 100-octane aviation gasoline and, before the fall of France, served in a similar capacity for that nation.

In international circles, Egloff has played a worthy rôle. He has been a delegate to twelve such congresses, before practically all of which he read papers, and was the presiding officer at several of them. Of these twelve, three were held in our own country; three in London, two in Rome, and one each in Tokyo, Berlin, Paris, and Glasgow. He is a

member of the Permanent Council for World Petroleum Congresses.

At the Tenth International Congress of Chemistry, held in Rome, May 15-21, 1938, at which we were fellow delegates, he presented, with Dr. Morrell, a paper before Section II (Fundamental Chemical Products) on "Motor Fuel from Butane Cracking and Catalytic Po'ymerization"; and before Section X (Chemistry and Transportation) one on "Isoöctane Motor Fuels."

He is also a member of the Joint Committee on Inter-American Engineering Coöperation, to act in an advisory capacity to the Inter-American Development Commission.

In March 1941, he was selected as one of those to participate in the National Research Council's Tour of Industrial Exploration of South America, under the sponsorship of the United States Government, and the extent to which he contributed to the success of this neighborly visit is evident from a perusal of the press notices at the time.

All chemists and chemical engineers of Colombia will merge in a new chemical society, Sociedad Colombiana de Químicos, recently installed in Bogotá. By-laws of the organization are similar to those of the American Chemical Society. The aims include professional protection, legislative activities, professional standing, public relations, encouragement of science and industry, compensation of chemists, aid to the government, meetings, ethics for chemists, and printing of journals. The main office is in Bogotá. Membership includes honorary, full, and associate members. The main publication will be *Anales de la Sociedad de Químicos*. Ballots, counted March fourteenth, elected A. M. Barriga-Villalba, president; Jorge Ancizar-Sordo, vice president; Jorge E. Orozco, secretary; and Roberto Jaramillo, treasurer. Gustav Egloff, was elected as the first honorary member of the Colombian Chemical Society during his stay in Bogotá.

Gustav Egloff, in Brazil, lectured before the Brazilian Chemical Association on April 24, 1941. The title of his address was "Petroleum as a Chemical Industry." On the same day, chemists belonging to the society held a banquet in the Casino da Urca attended by more than one hundred persons.

For the second time in twenty-two years, Argentine chemists had the privilege of listening to a distinguished American chemist. The first time, in 1919, the lecturer was Leo H. Baekeland; this year it was

Gustav Egloff, who discussed petroleum from the standpoint of chemistry and engineering. Both meetings were held under the auspices of the Asociación Química Argentina.

Dr. Egloff reviewed developments in the States in the petroleum industry. "There is no fundamental reason," he said, "why many of these processes, developed in the States, should not be used in Argentina so as to build a new synthetic chemical industry on a scale commensurate with this great country." His remarks on the production of toluene from petroleum were timely since the government has an explosives plant under construction and Argentina has petroleum but no coal or steel industries.

After the lecture, Dr. Egloff was guest of honor at a dinner of chemists, a monthly event of the Asociación Química Argentina from April to November, where he spoke as a member of the American Chemical Society and extended greetings to his fellow chemists in this part of the world. Dr. Egloff's short visit to Argentina has shown that mutual benefit would be derived if the visits of American scientists could be made more frequent.

The petroleum problem often troubles me, as it does many others, when we attempt to envisage the future, for, like others of the natural resources with which our country has been so bountifully endowed and which we have been consuming with such reckless extravagance, it is neither inexhaustible nor renewable, and what we will do when the supply begins to show signs of exhaustion has already given rise to much anxious thought.

Balzac's brilliant novel of the "Magic Skin", published in 1831, and perhaps the greatest flight of his genius, is not merely a fantastic story, but is also a profound and intensely realistic philosophical study. Raphael, Marquis de Valentin, dejected and discouraged by financial troubles and contemplating suicide, wandered one day into an old curiosity shop in Paris, where the aged shopkeeper urged him to accept a strange wild ass's skin of which he stood in fear. This skin was covered with Sanskrit characters and bore the mark called by some of the Eastern nations the Seal of Solomon. Raphael, who happened to be a Sanskrit scholar, translated the inscription which read as follows:

"Possessing me thou possessest everything. Yet I possess thee. So God has willed it. Wish, and thy wishes shall be accomplished. But measure thy wishes according to thy life. Here it is. I shall shrink with each wish, and so shall thy life. Wilt thou take me? Take me! God will hear thee. Amen."

Unwilling to face the stern realities of human existence and not content with its simple choice, Balzac's hero wants more than life can give and eagerly accepts the Magic Skin. Every wish is fulfilled, but in its fulfillment, his own vital powers shrink with the skin, as predicted, and his life goes out with the final disappearance of the latter.

In this vast deposit of liquid gold we call petroleum, have we come into possession of an Aladdin's lamp, or of a magic skin, and who can predict what will be its ultimate effect upon the history of this country? The answer will be worked out by the services of such brilliant men as Gustav Egloff.

> "The dead stars in the sky are still beheld
> Though centuries gone by their light was quelled,
> From such unreckoned height doth fall their light.
> So thoughts that but barren seem and without goal
> May, like those dead stars, gleam in some one's soul,
> When those that writ them sleep unfathomably deep."

Following the dinner and speakers in honor of Dr. Egloff, Dr. Robert E. Wilson, president of Pan American Petroleum and Transport Company, was introduced by the chairman, Dr. E. H. Northey. After tributes to Dr. Egloff and Dr. H. J. Halle for their achievements in raising Universal Oil Products to its present position of eminence, Dr. Wilson stated that he was one of those who heard Dr. Egloff speak to the court on emulsions for twenty-one days, but that the question asked Dr. Egloff by the opposing attorney, which started the lecture, was not "Bring in all you can find on emulsions", but "What do you know about emulsions?"

Dr. H. J. Halle, president of Universal Oil Products Company was then introduced, and he took the opportunity to read the editorial from the February 16, 1928, issue of the St. Louis Post Dispatch, which was written about Dr. Egloff's twenty-one day lecture on emulsions to the court. This editorial and additional comments from *The Oil and Gas Journal* follow:

Advises Against Asking Doctor Egloff As to What Time It Is

The suit of the Universal Oil Products Co. against the Standard Oil Co. of Indiana which has been in the courts since 1913 involving the alleged infringements of the Universal's patents by the Standard in the operation of the Burton cracking process has apparently established another record. Dr. Gustav Egloff of the research department of the Universal company who went on the stand last November is still giving testimony according to advices from St. Louis.

Several hundred pages of testimony had already been given in the case when the case was reopened to take depositions at St. Louis. Doctor Egloff was the first and up to the present time the only witness.

His long stay on the stand recently has attracted the attention of the St. Louis newspapers and during the past week the Post-Dispatch of that city commented editorially as follows regarding Doctor Egloff's feat:

Here's to Doctor Egloff

"We are lost in admiration of Doctor Egloff, oil expert of the Universal Oil Products Co. of Chicago. In the dim, dead days of last November, he took the witness stand in a suit of his company against the Standard Oil Co. No matter what the suit is about. Doctor Egloff today (February 16) is still on the stand and still talking. The workaday world has saluted the Armistice Day colors, waxed fat on Thanksgiving turkey, dressed a Christmas tree, observed the New Year's saturnalia and paid court to its lady love on the day of St. Valentine—and Doctor Egloff is still testifying. How does he do it? Well, one day an unwary attorney asked him to define emulsion. Snapping into the subject, Doctor Egloff answered him in seven calendar days of four hours each.

"We recall Senator Morgan's mot. 'How long, Senator,' inquired the young lady, 'can you speak on any given subject?' 'It all depends, my dear,' replied the great solon gravely. 'If it is a subject I know all about, I can talk

for 30 minutes at a stretch. If it is a subject on which I am completely ignorant, I can talk indefinitely.'

"Such is not the case with Dr. Egloff. He who doubts that Doctor Egloff understands the etiology, etymology, anthropology and cosmology of emulsion is automatically elected to the skeptic's society. We are confident that Doctor Egloff, far from being addicted to Morganatic bombast, is a profound scientist. We repeat that we admire him, but—remembering the seven-day reply to the emulsion question—we would never be so incautious, especially if we were in a hurry, to ask him what time it is."

Oil & Gas Journal, February 23, 1928.

Among the numerous telegrams and congratulatory letters read at the meeting were the following:

UNIVERSAL OIL PRODUCTS COMPANY

310 South Michigan Avenue.

Chicago, Ill.

October 19, 1942

Dr. Gustav Egloff, President,
American Institute of Chemists,
52 E. 41st St.,
New York, N. Y.

Dear Dr. Egloff:

It is a source of great pride and satisfaction to me and your many other friends in the Universal organization that you are being honored this evening by the American Institute of Chemists in recognition of your many achievements and contributions in the field of petroleum hydrocarbons. This reward you well deserve.

Your works and your successes are known throughout the world. It is not generally known, however, that you are dedicating your whole life, your energy, and your mind to the petroleum art and industry; and that this fine ideal is being accomplished through intensive work, crowding two years of efforts into one, something you have been doing without interruption for the past twenty-five years of our association. We who live and work with you can testify to your

impersonal and unselfish devotion to a worthy undertaking. You personify the spirit of service to others that permeates our entire organization. Your performance is an incentive to many of your co-workers.

Others do not know that you have many contributions to your credit which through necessity must be temporarily withheld from the public. When the restrictions are removed, you will be in position to release a backlog of many new developments and discoveries of the past few years that will add enormously to the knowledge of others.

Your excellent ideal, your sincerity of purpose, and your work well done, is laying a foundation that will make you live forever. You have been a large contributor to our success and everyone in the Universal organization admires you, Gus, and holds you in the highest esteem. It is to be hoped that we may enjoy another twenty-five years with you which will be even more fruitful than the past quarter century of our relationship. We all join in honoring you on this eventful evening of your career.

Sincerely yours,

signed, J. G. Alther, Vice President,
Universal Oil Products Company

WESTERN UNION TELEGRAM

Chicago, Ill., October 23, 1942

Dr. Gustav Egloff

Congratulations on the new honor being bestowed upon you but don't forget that back in Chicago you are still my consultant on all scientific questions. Best wishes from your many friends in this WPB Office.

J. L. Overlock, Regional Director, War Production Board.

WESTERN UNION TELEGRAM

Los Angeles, Calif, Ooctober 22, 1942.

Gustav Egloff

May I add my congratulations along with many others in recognition of your outstanding accomplishments. Best personal regards.

Wright W. Gary, President, Filtrol Corporation.
(Ex-Director Oil Refining Section, Office of Petroleum Coördinator
Washington, D. C.)

Wartime Chemicals from Natural Gas

Address before The American Institute of Chemists, Chemists' Club, New York, 8 p.m., October 23, 1942.

By Dr. Gustav Egloff, F.A.I.C.

Director of Research, Universal Oil Products Company, Chicago, Illinois

FOR many years natural gas has been used mainly for heating and generation of steam and electrical power. In the last few years, however, the tempo of research and development has increased enormously. A much higher field of utilization for natural gas than as fuel is seen in the conversion of the hydrocarbons into superior aviation gasolines, lubricants, synthetic rubber, explosives, acetylene, anaesthetics, plant life promoters, plastics, solvents, and many other chemical derivatives. A vast supply of these derivatives is available in natural gas produced in this country.

The processes and methods for such conversion in some instances are already in commercial use in the petroleum refining and other industries. Other methods have been worked out in the research laboratories and the processes and yields that can be achieved are known; but it remains necessary for further research to establish the means to reduce costs to the level of commercial practicability. Another wide avenue for future development in the natural gasoline and refining industries is thus foreseen.

Natural gas is consumed at the rate of over 2.6 trillion cubic feet per year. The United States has proven reserves of 85 trillion cubic feet and another 85 trillion as potential reserves. The yearly consumption of natural gas is equivalent in fuel value to 100,000,000 tons of coal or over 500,000,000 barrels of fuel oil.

In the Axis countries, methane gas is a widely used substitute motor fuel. As a matter of fact, there are over 107,000 compressed gas (methane, ethane, propane, butanes) propelled motor vehicles operating in continental Europe, which conserved about 2,300,000 barrels of gasoline for military use. The compressed gas is sold at filling stations

in exactly the same way as gasoline in the United States. The gases are compressed under pressures up to 5000 p.s.i. into steel cylinders attached to the running board of the car or under the floor of trucks and busses. Italy has a number of natural gas wells and is operating many busses and trucks plus a number of locomotives on methane gas. This looks like a desperate measure since it requires on the average about 135 pounds of steel for each of these high pressure steel alloy cylinders in order to withstand the high pressures. The products of fermentation of sewage are also used as a source of methane gas in Germany. Methane from coal gas is used for running motor vehicles of one sort or another in many of the European cities. Many coal hydrogenation units produce gasoline in addition to methane, ethane, propane, and butanes by the Bergius and Fischer-Tropsch process. The latter process will be referred to later in more detail because it is a potential source of many products. Busses, trucks, tractors, and power shovels, totaling over 25,000 in the United States, use compressed propane and butane. One truck company has liquefied butane functioning in a dual rôle as a refrigerant for fruits and meats and as motor fuel for the truck after the cooling has taken place.

Hydrocarbons present in natural gas are methane, ethane, propane, butanes, pentanes, hexanes, and heptanes, etc. The first four of those are gases while from pentane on they are liquids useful as gasoline.

The individual hydrocarbons have a variety of uses in a number of industries. Propane has been suggested for use as a fuel for breaking in aviation engines on the "test block", since it has a high octane value and is readily available. Such a procedure would conserve the 100 octane liquid fuels needed for fighter, bombing and cargo airplanes in the war effort. Other uses for propane which have gained wide commercial application are as refrigerants and solvents in the refining of lubricating oils. Paraffin wax, asphaltic substances, naphthenic hydrocarbons and other materials are eliminated from lubricants when propane is used as the solvent. Over fifty per cent of the world's lubricating oils are improved in quality by the use of propane.

Two hydrocarbons present in natural gas of great utility are isobutane and isopentane. Isobutane is the key hydrocarbon in the production of aviation gasoline by alkylation with olefins. In general, there is not enough isobutane available, hence it has been necessary to isomerize the normal butane present in natural gas to the iso compound. A

number of commercial installations are in operation and under construction to isomerize normal butane to isobutane. Normal and isopentane are also present in natural gas, and it is highly desirable to fractionate out the iso compound due to its 91 octane rating in contrast to the normal which has an octane number of 64. Isopentane is blended with aviation gasoline in percentages ranging from ten to twenty, depending upon the other components in the final blend.

Olefinic hydrocarbons, not contained in natural gas as such, are important for many reactions not alone for aviation gasoline but for synthetic rubber and a host of other products. There are several routings to produce olefins from natural gas: one is high temperature, and the other by catalysis. The olefinic hydrocarbons which are now in great demand are ethylene, propylene, butylenes, pentylenes and butadiene. Natural gas, particularly the propane-butane fraction, when subjected to high temperature cracking, produces ethylene, propylene, butylenes and butadiene. Normal butane is readily converted into butadiene in one or two stages by catalytic means at high temperature with yields reported of over sixty per cent.

A branched chain paraffin, isooctane, is of great importance in the aviation fuel program. There are two methods whereby this hydrocarbon is derived, one is by polymerization in which isobutylene is polymerized to a dimer in the presence of phosphoric acid as a catalyst. Isooctene is the product, and upon the addition of hydrogen, isooctane results. Isooctane has an octane rating of 95-100. Another method of producing aviation gasoline is to polymerize the propylene, butylenes, and pentylenes present in cracked gases to a polymer gasoline under selective conditions which upon hydrogenation yields an aviation gasoline blending product of 90 octane rating.

The polymerization process has been largely replaced by the alkylation process in which isobutane is alkylated by butylenes in the presence of sulfuric or hydrofluoric acid catalysts. The resulting alkylate ranges in octane value from 91 to 96. The simplest of the olefins is ethylene which is used to alkylate isobutane at temperatures in the order of 950°F. and pressures up to 5000 pounds. This reaction produces neohexane having an octane rating of 94, an important hydrocarbon for aviation gasoline. In addition to alkylating ethylene and butylenes, propylene and pentylenes are also being alkylated with isobutane to form additional quantities of high quality aviation gasoline. It is proposed in

some type of operation to utilize the mixtures of propylene, butylenes and pentylenes in the alkylation reaction with isobutane using hydrofluoric acid as alkylating catalyst to produce alkylate of 91 octane rating highly suitable for aviation gasoline blending stock.

An important aviation blending fuel of an entirely different type is cumene, which is produced from the alkylation of propylene and benzene in the presence of solid phosphoric acid. A number of commercial units are now in operation.

Normal hexane and heptane are two hydrocarbons which from a motor fuel standpoint are practically worthless unless their molecular structure is changed. Normal heptane has a zero octane rating and hexane about 25. These straight-chain paraffin hydrocarbons, hexane and heptane, can be changed in configuration and also in their properties to improve their antiknock properties, Hexane and heptane can also be converted into benzene and toluene—two important hydrocarbons for high explosives. Benzene is of vital importance in the production of styrene, which is produced by the alkylation of benzene with ethylene forming ethyl benzene. Dehydrogenation of this compound yields styrene. When styrene (25 per cent) and butadiene (75 per cent) are mixed in the presence of a catalyst such as peroxide, polymerization takes place to form the synthetic rubber Buna-S.

The synthetic rubber program in the United States calls for 886,000 tons as planned in September 1942, distributed as follows:

Types	*Tons*
Buna-S	705,000
Butyl	132,000
Neoprene	49,000

However, the recommendations of the Baruch Committee called for an increase of 220,000 tons to be apportioned as:

Types	*Tons*
Buna-S	140,000
Neoprene	20,000
Thiokol	60,000

Out of the total 886,000 tons of synthetic rubber planned for the United States, 705,000 tons of it will come from butadiene and styrene. The normal butane that will be used for butadiene will represent about 80,000 tons a year derived largely from natural gas. One plant has

a rated capacity of 66,000 tons and the other 15,000 tons a year.

More than 100,000 barrels a day of normal butane are available from natural gas. If this were used just for butadiene making, it would satisfy the entire butadiene requirements in our present synthetic rubber program. Hence, it can be seen that the natural gas industry has more than enough of the hydrocarbons which can be converted into raw materials to supply the entire synthetic rubber program. Another important source of butadiene is through the dehydrogenation of butylene derived from catalytic cracking. This source will yield at the rate of 283,000 tons annually.

Another type of synthetic rubber is called Thiokol, made by chlorination of ethylene which is then refluxed with sodium polysulfide. The synthetic rubber program calls for 60,000 tons of Thiokol yearly. Hydrogen sulfide is present in varying percentages in natural gas and is readily converted into flowers of sulfur. This sulfur may react with caustic soda to produce sodium polysulfide. After reacting ethylene with chlorine, the dichlorethane is formed which reacts with the polysulfide, yielding Thiokol. The plans call for the use of Thiokol in retreading of tires.

Besides butadiene, styrene, and ethylene, a hydrocarbon of great importance is acetylene, used in the production of the synthetic rubber; neoprene; it is also the base material for nylon, a replacement product for silk. Calcium carbide is produced from coal and lime in electric furnaces requiring much electrical power. When water is added to this compound, acetylene is formed.

Natural gas or products therefrom under high temperature conditions yield acetylene readily. Two commercial acetylene units are being installed at the present time, one of which will produce at the rate of 75 tons per day or 27,000 tons a year. Other units are also under way. The charging stock may be either propane, butane, natural gasoline or fractions from petroleum. It is believed that acetylene can be produced at a lower cost from processing natural gas than by the electrochemical method of producing calcium carbide. The natural gas industry has enormous volumes of propane and other hydrocarbons available to supply the whole needs of the United States for acetylene and its derivatives.

Germany uses acetylene made from calcium carbide converting it into butadiene by a four-stage chemical process. Neoprene rubber is made

from acetylene treated with hydrochloric acid. This type of rubber will be produced at the rate of 49,000 tons a year in the United States.

The Russians start primarily with ethyl alcohol from grain to produce butadiene. Butadiene from ethyl alcohol derived from grain will be one of the sources in the United States synthetic rubber program. The tonnage of butadiene from grain alcohol will be at the rate of 242,000 tons a year, representing about one-third of the Buna-S type production.

There are several other types of rubber which are in commercial production, one of which is the type based on isobutylene from dehydrogenation of isobutane from natural gas or from cracking of oil. Isobutylene is copolymerized with about two per cent of butadiene or isoprene resulting in a product called Butyl rubber. In the government program this type of rubber will be produced at the rate of 132,000 tons a year. Butyl rubber, as of today, is not as good a synthetic rubber for tire use as the Buna-S. Tires made of Butyl rubber have a mileage life of about 12,000 miles with a maximum road speed of thirty-five miles an hour. This will naturally be improved upon.

There is an important use for synthetic rubber which is fabricated so that billions of minute air cells are present; it is used as a liner in gasoline tanks in fighting, bombing, and pursuit planes. When a bullet goes through the tank, the rubber causes it to be self-sealing.

Another type of synthetic rubber is the acrylonitrile-butadiene which can be produced also from natural gas and is known as Buna-N or Perbunan.

One of the necessary materials in the compounding of either natural or synthetic rubber is carbon black which is made from natural gas. Carbon black is an important component in tires or other rubber goods whether it is blended with natural or synthetic rubber, as the properties of rubber, particularly from the standpoint of the tensile strength and wearing qualities under service conditions, are greatly improved. During the year 1940 about 369 billion cubic feet of natural gas were converted, largely by the channel process (air oxidation), into carbon black with an average of 1.54 pounds per cubic foot of gas or about 285,000 tons, of which about eighty-five per cent was used in tires. Furnace black appears to be superior for use in synthetic rubber.

The world's natural rubber production for 1941 was about 1,675,000 long tons of which the United States imported over 800,000 long tons.

The United Nations have lost over ninety-five per cent of the world's natural rubber sources and Russia has lost two of its synthetic rubber plants in the Ukraine.

With the tremendous increased demand for airplanes, tanks, motor trucks, ships, trains, gun mountings, etc., rubber is required in ever increasing quantities by both the fighting forces and the necessary civilian users for the successful conclusion of World War II. A medium size tank requires 500 pounds of rubber, small pontoon bridges 1000 pounds, for flying fortresses the gasoline tank alone requires 500 pounds of bullet-sealing rubber, while a large bomber uses 1250 pounds, gas masks 0.75 pounds, and battleships between 75,000 and 150,000 pounds. Tires for large excavation trucks used by the Army have a diameter of 9.5 feet and weigh over 3500 pounds. There are many hundred more products requiring rubber that are vital in the war effort, such as blimps, barrage balloons, rubber boats, rafts, and life vests and suits for flyers, hospital rubber needs, etc. Millions of soldiers on the fighting fronts require rubber in one form or another.

The synthetic rubber picture in the United States, with its 886,000 tons a year at plant costs of about $800,000,000 are already well under way. The Baruch Committee has recommended that this tonnage be increased to 1,106,000 tons a year. In addition to being the arsenal for many other war products, synthetic rubber will also have to come from the United States to supply our allies' needs. It may well be assumed that even 1,106,000 tons of synthetic rubber will be too low for the United Nations' requirements.

The question arises now: Is the synthetic rubber product equal to the natural? In general, one can say that synthetic rubber is at least equivalent to the natural; the chemist's goal is not necessarily to synthesize a duplicate of natural rubber, but it is certain that whatever properties rubber has that are needed will not only be duplicated, but radically improved and new ones added. Synthetic rubber is superior to natural rubber in gasoline, oil and chemical resistance. The synthetic product is more stable to light and air, and has greater wearing properties. Some trucks using synthetic rubber tires have gone over 35,000 miles. Sidewall tire strength is greater, meaning greater safety and better road gripability. The latter property has been tested out thoroughly on wet and muddy roads. Tests on hills with different

trucks have shown that the synthetic rubber-tired vehicle goes up a hill with very little side-slipping, whereas the tires of natural rubber slipped all over the road. On curves when operating the car at high speeds, the synthetic tire is safer than the natural.

With the number of research men in the field of synthetic rubber, with expenditures of millions of dollars yearly, one can feel confident that synthetic rubber tires will evolve with a life of *at least* 100,000 miles or, expressed another way, the tires may well outlive the motor car.

As far as the author is concerned, synthetic rubber in the United States is here to stay and will be a permanent industry during the next peace period. With the fall of Singapore our greatest source of natural rubber was cut off. Natural rubber (December 1941) cost about 22 cents per pound. The price ranged through the years from 3.5 cents to over one dollar per pound. It can be stated that synthetic rubber in mass production will cost less than fifteen cents a pound.

Does this mean that natural rubber will not have its uses? As far as tires are concerned, it will not have the dominating position it has held heretofore. One may be certain that as good as synthetic rubber is today, it will be far surpassed by that yet to come. The properties of the rubber desired will be under close chemical control based upon the high purity of the components started with, catalyst, and precise conditions to yield the finished product. Natural rubbers vary widely in properties, due to many factors. Producers of natural rubber depend upon the life cycle of the rubber tree, climatic and soil conditions, while the chemically produced rubber will have the exact properties for which its structure and use was designed. Natural rubber contains a number of unknown components, whereas synthetic rubber has one, two or three components of known characteristics.

Natural gas is an important source of high explosives. Natural gas in some parts of the country is being cracked into hydrogen which is combined with the nitrogen from the air, producing synthetic ammonia. The ammonia is readily oxidized with air into nitric acid. Combination of the ammonia and nitric acid produces ammonium nitrate.

In World War I, the maximum toluene production was at the rate of 15,000,000 gallons a year and practically all came from coal carbonization plants to derive coke for steel making, with toluene as a by-product. The toluene production in World War II from coal carbonization is

at the rate of over 25,000,000 gallons a year. According to published reports the demand for toluene is from 250 to 300,000,000 gallons a year—the difference between the volume of toluene from coal and the total demand will come from petroleum, i. e., ten to twelve times as much from petroleum. In comparing the two wars the increased demand for toluene is from sixteen to twenty times. On a T.N.T. basis World War I called for 150,000,000 pounds, whereas the *present war calls for* 3,000,000,000 *pounds a year*. Benzene is readily converted into carbolic acid or phenol through chlorination and hydrolysis. Combine the phenol with nitric acid and picric acid is the result, a high explosive, and when synthetic ammonia reacts with picric acid, ammonium picrate is formed, another high grade explosive. The ammonium picrate is relatively stable, but when picric acid is used, it reacts readily with iron to form iron picrate, a very unstable compound that has a habit of exploding when least expected. That is what happened in a number of plants in World War I.

Many natural gases contain hydrogen sulfide which when oxidized with air is converted to sulfuric acid necessary in so many arts, particularly high explosives. A number of commercial units are producing sulfuric acid based on hydrogen sulfide or elemental sulfur produced from natural gas as a starting material. So we have sulfuric and nitric acid, both produced from natural gases, raw materials necessary for high explosives needed in this present war, some of which are on a scale over twenty times that of World War I.

An important substance in war is glycerine for the production of trinitroglycerine, the commonest form of which is dynamite. The main source of glycerine has been in the splitting of fats to glycerine and fatty acids in the soap-making industry. As is well known, a campaign is on for the conservation of cooking fats of all kinds, which has been requested by our government. These fats have many uses, one of them being the manufacture of soap and glycerine. A few years ago a glycerine-making process was developed by the petroleum industry starting with propane or propylene, which are chlorinated and then hydrolized to glycerine. The glycerine is then nitrated to trinitroglycerine.

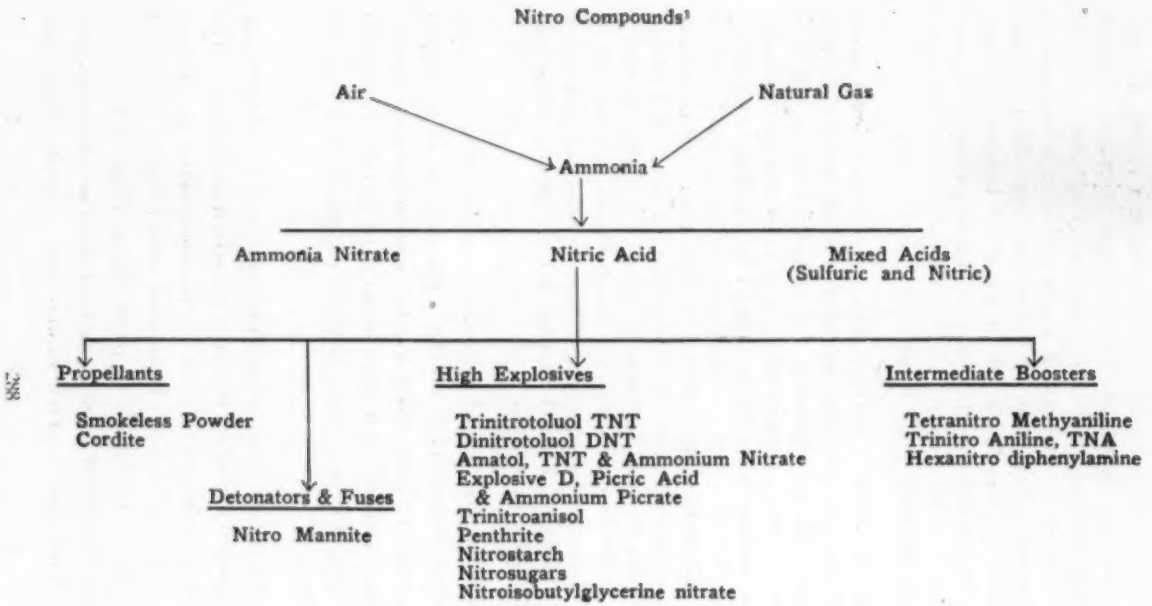
Nitroparaffins from natural gas may well develop into one of the newer and valuable sources of high explosives. Methane gas when

nitrated produces tetranitromethane. This compound is the most destructive explosive known to man. This product is a very high explosive, extremely difficult to handle. About twenty years ago in a university laboratory in Switzerland, they were working with tetranitromethane which is usually a reaction product of toluene nitration in small concentrations. *Ten grams of tetranitromethane* killed ten individuals, wounded twenty, and nearly wrecked the building. Unfortunately, no commercial process has been worked out to make this product available for use by our armed forces. Figure I shows the importance of nitro compounds in the manufacture of explosives.

Anaesthetics are vital in a world at war. One of the primary needs of the medical profession has been anaesthetics which do not have post-operative dangers due to pneumonia and nausea. Ethylene has been shown to have properties superior to those of ether and nitrous oxide. Deep surgical anaesthesia is readily induced by ethylene and insensibility to pain comes rather quickly. A general feeling of well being and comfort with no harmful after effects is present when ethylene is used. Cyclopropane, although known since the year 1882, was still a laboratory curiosity until the end of 1930 when it was first applied in human anaesthesia. It has been rather widely adopted since as being one of the safest anaesthetics. Cyclopropane produced from either propane or propylene by a series of chemical reactions is less explosive in the hospital than either ether or ethylene.

Olefins have been investigated as fruit ripening agents and for use in inducing an accelerated plant growth. The first gas to be utilized for this purpose was ethylene, which was first used in an impure form—the fumes from a kerosene stove were found to be effective in bringing about the ripening of citrus fruits. Ethylene was the agent responsible for the ripening.

Ethylene and propylene stimulate potato growth, and have been found to shorten the growth season for tomatoes, grapefruit and oranges. The German Botanical Society reports that up to a one-hundred per cent increase in the yield of potatoes can be obtained when the seeds are treated with ethylene gas. "The tubers of plants grown from seed potatoes which had been exposed for twenty-four hours to atmospheres containing 7.5, 15 or 30 per cent gas at 65° F. were more numerous, larger and



1 F. H. Dotterweich, Refiner 21 #3, 51-6(1942)

Figure 1

richer in vitamin C. It is claimed that this process is cheaper than the application of hormones."

Researches by the Russians on butylene gas showed a stimulating effect on the maturing time of such trees as the walnut, peach, apple, cherry, plum, apricot, and pear. In periods when the season is too short to allow the full maturing, due to winter weather being so prolonged that flower formation and fruit setting are delayed, butylene may be used to hasten the growth period. The procedure adapted to plant treatment consists of enclosing the trees in tents or gastight covers for about two weeks before the normal or desired leafing, i. e., start of the growth cycle. Butylene is passed into the tent in about one part per 100,000 parts of air, at temperatures between 69° and 100° F. for a period of one to two hours.

Another method for ripening fruits is to use pentylenes, hexylenes, and heptylenes from cracked gasoline. Addition products of the unsaturated hydrocarbons derived from cracking, such as ethylene di-iodide, ethylene butyrohydrin, ethylene acetohydrin and ethylene formohydrin are also used as agents for furthering the ripening of fruits.

The skin of the green fruit absorbs the olefin or olefin derivative, destroying the chlorophyll. The advantage in using liquids as ripening agents is that they are absorbed and continue their action after removing the fruit from the liquid; after storage under normal conditions, the ripening is complete.

Natural gas hydrocarbons can be used as basic materials for the synthesis of plastics after forming olefinic hydrocarbons. There are three basic reactions which in various combinations are used to produce plastics from the derived hydrocarbons; they are oxidation, halogenation (mostly chlorine is used) and polymerization. Stemming from these reactions, the entire plastics industry has built up new materials and replacement products for many structural materials and rubber. Figure 2 shows some of the derivatives of the unsaturated hydrocarbons from natural gas[1].

The materials which are outlined in the chart have many uses besides plastics as the intermediates shown are a typical cross section of the chemicals derived from natural gas. The finished plastics, as well as

---

1. R. L. Wakeman, Nat. Petroleum News, July 23, 1941, p. R-226.

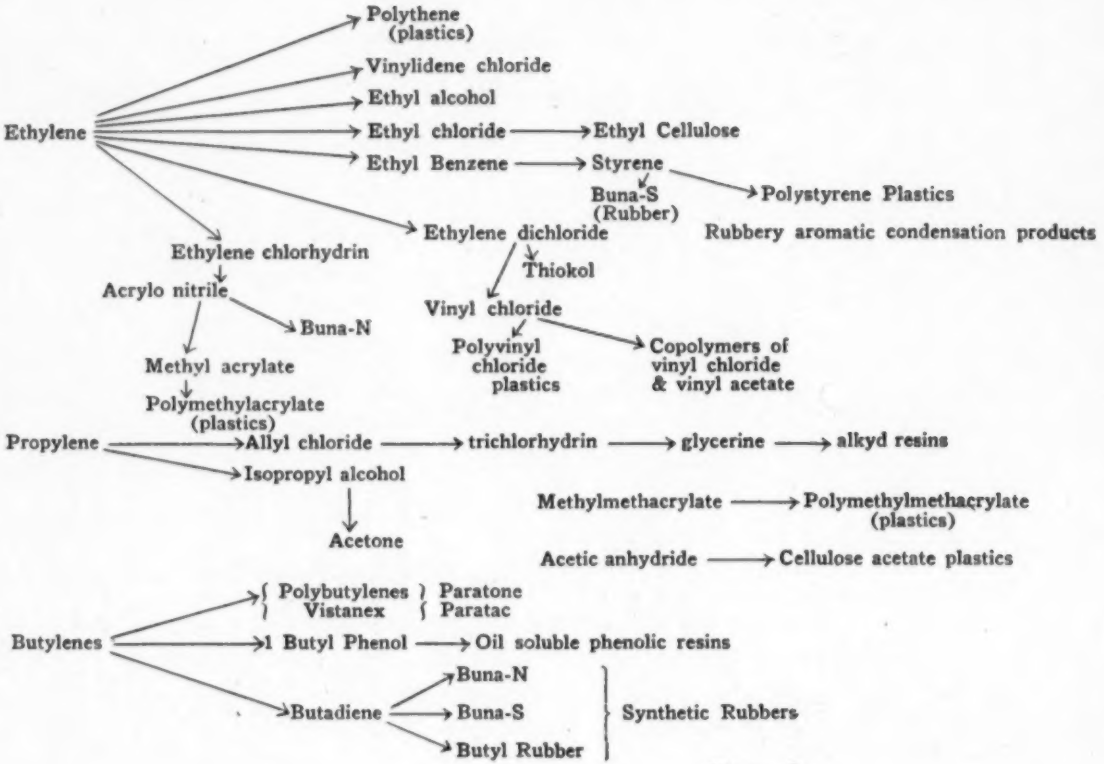

Polythene (plastics)
Vinylidene chloride
Ethyl alcohol
Ethylene
Ethyl chloride
Ethyl Cellulose
Ethyl Benzene
Styrene
Buna-S (Rubber)
Polystyrene Plastics
Ethylene dichloride
Rubbery aromatic condensation products
Ethylene chlorhydrin
Thiokol
Acrylo nitrile
Vinyl chloride
Buna-N
Polyvinyl chloride plastics
Copolymers of vinyl chloride & vinyl acetate
Methyl acrylate
Polymethylacrylate (plastics)
Propylene
Allyl chloride
trichlorhydrin
glycerine
alkyd resins
Isopropyl alcohol
Methylmethacrylate
Polymethylmethacrylate (plastics)
Acetone
Acetic anhydride
Cellulose acetate plastics
Polybutylenes
Vistanex
Paratone
Paratac
Butylenes
1 Butyl Phenol
Oil soluble phenolic resins
Buna-N
Butadiene
Buna-S
Synthetic Rubbers
Butyl Rubber

Figure 2

the intermediate compounds, find use as paints, varnishes, addition products for lubricating oils, and molded materials. Their intermediates are used as solvents, cleaning agents, and as additives for various types of products.

The coming importance of plastics cannot be over-emphasized at this time, since airplane manufacturing is calling for more of the plastics for use in plywood planes. Steel now used in many places is being replaced by plastics. In the war industries where the fabrication of planes takes place, the methylmethacrylate resins are used as the transparent non-shatterable parts where great visibility is necessary, and this will undoubtedly be used by the automobile industry after the war is over. A high degree of visibility from all over the motor car will be worked into the new design requiring less supporting frame work, and a clear vision rooftop with sliding window will undoubtedly take the place of present designs. In fact, the motor car of the future may well be substantially all plastics.

At the present time any of the components necessary for the manufacture of plastics of all types can be made from natural gas. One of the important substances for the Bakelite type of plastic manufacture is formaldehyde, made largely from the methanol or wood alcohol by the catalytic reaction of carbon monoxide and hydrogen at high pressures. For a number of years formaldehyde and methanol have been produced from the oxidation by air of natural gas. This process can be readily expanded to produce all the formaldehyde necessary in the ever expanding Bakelite program. The phenol or carbolic acid and cresols, etc., are also potentially available from natural gasoline.

One big field of research and development that merits discussion is carbon monoxide and hydrogen or the water gas reaction to form hydrocarbons. In the United States we have over 2.6 trillion cubic feet of natural gas yearly production. This gas contains about ninety per cent of methane which can be converted into carbon monoxide and hydrogen by high temperatures in the presence of steam. In Germany the Fischer-Tropsch process has been developed to produce oil from carbon monoxide and hydrogen at the rate of about 15,000,000 barrels a year. The hydrocarbons produced are methane, ethane, ethylene, propane, propylene, butanes, butylenes, gasoline, gas oil, and Diesel oil to solid paraffin wax. The reaction takes place in the presence of a catalyst, which

may be oxides of nickel, chromium or cobalt, using temperatures of 400° F, and pressures of the order of 200 pounds.

The gasoline produced by the water gas reaction is poor in quality with about a 40 octane rating. The gasoline has to be cracked thermally or catalytically into higher octane fuel. The gasoline fraction boiling up to 300° F. contains olefins which polymerize with each other to form lubricating oil. These lubricating oils are produced commercially in Germany and some of them are high grade. The balance of the gasoline fraction, the paraffins, hexanes, heptanes, octanes may be thermally cracked under controlled conditions to make more olefins which in turn are converted into lubricating oil by polymerization. A portion of the synthetic oil is a high grade Diesel oil with octane number of over 100. The Diesel oil fraction is blended with lower grade Diesel oils to improve its quality.

Paraffin wax, which is also derived from the water gas reaction, is oxidized with air to make fatty acids. The fatty acids are reacted with potassium or sodium hydroxide, and soap is produced. The last report out of Germany is that one small cake of soap is allotted per inhabitant per month, and much of it comes from this paraffin wax. In 1938 and previous years also, conversion of paraffin wax from the water gas reaction, coal carbonization, and petroleum, was carried out forming fatty acids. In addition, these fatty acids are combined with synthetic glycerine to make *fats for food*. Glycerine and soap are produced (United States) from the splitting of fats, but the Germans are reversing the process in order to produce edible fats for food. It is not the type of fats to which we are accustomed, but it is helpful under the critical food conditions existing in Europe.

An enormous amount of research is going forward in a study of natural gas and gasoline to enhance their importance in the war effort—through solvents, plastics, high explosives, acetylene, synthetic rubber, lubricating oils, and aviation gasoline. As a matter of fact, if one starts with methane gas alone, all of the known synthetic products that man has produced in organic chemistry can be derived, and there are over 500,000 different ones. *Any synthetic product desired can be produced at a price;* the hydrocarbons are all potentially available to be converted into the manifold products that man requires in a modern world.

COUNCIL

OFFICERS

President, Gustav Egloff
Vice-president, Donald Price
Secretary, Howard S. Neiman
Treasurer, Walter J. Murphy

COUNCILORS

E. R. Allen
Donald H. Andrews
Frank G. Breyer
Stuart R. Brinkley
Harry L. Fisher
Charles N. Frey
Frank O. Lundstrom
Robert J. Moore
Foster D. Snell
W. D. Turner

CHAPTER REPRESENTATIVES

New York	*Niagara*	*Philadelphia*	*Washington*
Marston L. Hamlin	A. W. Burwell	Gilbert E. Seil	Albin H. Warth

October Meeting

A special meeting of the National Council of The American Institute of Chemists was held on Friday, October 23, 1942, at The Chemists' Club, 52 East 41st Street, New York, N. Y., at 4:00 p.m.

President Gustav Egloff presided.

The following officers and councilors were present:

Messrs: G. Egloff, H. L. Fisher, M. L. Hamlin, R. J. Moore, W. J. Murphy, H S. Neiman, D. Price, F. D. Snell, W. D. Turner, and M. Toch. Miss V. F. Kimball was present.

Upon motion made and seconded, the reading of the minutes was dispensed with at this meeting.

The Treasurer's report, showing a total of cash and bonds of $5581.33 with bills payable of $482.55, was read and accepted.

The Secretary reported that we now have a total of 1762 members.

The proposed changes in the names of membership classifications were discussed, and upon motion made and seconded, it was decided to appoint a Committee of three to consider this with a view to presenting these changes for action at the next annual meeting, with the request that the Committee report its findings at the January meeting of the National Council.

The Secretary read a letter from The Chemists' Club, which announced that the price of the dinner would be increased to $2.00 after October 31st.

The Secretary read a letter from Dr. R. K. Carleton with reference to a proposed survey of the chemists in the New England area.

A letter from the War Manpower Commission was read which requested a copy of the Survey of Chemists made by the Washington Chapter.

Dr. Price read portions of the proposed membership leaflet, and upon motion made and seconded, he was requested to send copies of this leaflet to each member of the Council for comment and suggestions.

A letter from Charles F. Pitt, 3rd, was read, and upon motion made and seconded, the Secretary was instructed to write a letter to the head of the Selective Service Board in Washington requesting that this man be given the deferment suggested by the employer, and to point out the importance of maintaining chemists in industry; and send a copy of this letter to the local Board of Appeal. It was suggested that THE CHEMIST should contain a statement that the INSTITUTE will coöperate with those members in endeavoring to obtain deferment for chemists needed in industry.

The Secretary read a letter from Dr. Moore relative to the application of Adolph A. Boehm, who was elected to Junior membership in August, 1942, and upon motion made and seconded, Mr. Boehm was raised to Associate membership.

Dr. Egloff reported that the Chicago Chapter of the INSTITUTE was interested in having degrees in chemistry of a uniform nature throughout the universities, and upon motion made and seconded, the members of the Chicago Chapter were requested to draft a resolution presenting their ideas for action at the appropriate Council meeting.

Dr. Egloff presented the subject of the proposed coöperation between the Chemical Societies of North and South America, and after discussion, it was suggested that we determine what professional problems face the members of the South American Societies.

Upon motion made and seconded, the following new members were elected:

FELLOWS:

Althoff, Carl A.
(1942), *Chemist*, Pure Calcium Products Division, Diamond Alkali Company, Box 407, Painesville, Ohio.

Clingan, Bruce W.
(1942), *Superintendent Technical Service*, The Sherwin Williams Company, Brown and Lister Avenue, Newark, New Jersey.

Greco, William J.
(1942), *Coordinator of Technical Information*, Socony Paint Products Division, Socony Vacuum Oil Company, Inc., 5-22 46th Avenue, Long Island City, New York.

Hall, Lloyd A.
(1942), *Chief Chemist and Director of Research*, The Griffith Laboratories, Inc., 1415 West 37th Street, Chicago, Illinois.

Harkins, William D.
(1942), *Andrew MacLeish Distinguished Service Professor, Emeritus*, Kent Chemical Laboratory, University of Chicago, Chicago, Illinois.

Rinehart, Wilmer T.
(1942), *Research Chemist*, U. S. Gypsum Company, 1253 Diversey Parkway, Chicago, Illinois.

Stoppel, Ernest A.
(1942), *Technical Director*, Valspar Corporation, 364 Manhattan Avenue, Brooklyn, New York.

ASSOCIATES:

Peterson, Edwin P.
(A.1942), *Research Chemist*, National Lead Company, 105 York Street, Brooklyn, New York.

JUNIORS:

Formikell, Alec E.
(J.1942), *Chemist,* General Cable Corporation, Rome, New York.

Jacobson, Bernard L.
(J.1942), *Chemist,* Standard Varnish Works, 2600 Richmond Terrace, Staten Island, New York.

Upon motion made and seconded, it was decided to hold the next meeting of the National Council on Friday, December 11, 1942, at 4:00 p.m.

There being no further business, adjournment was taken.

Applications for Membership

For Fellow:

Bull, George G.
Chemist, Socony Paint Products, 5-22 46th Avenue, Long Island City, New York.

Burright, Ora B.
Nutritionist and Home Economist, Writer, Room 615, 110 West 42nd Street, New York, N. Y.

Cohan, Leonard H.
Chief Chemist, Continental Carbon Company, 6130 W. 51st Street, Chicago, Illinois.

Drimer, David
Chemist, Clover Leaf Paint and Varnish Corporation, 43-43 Vernon Boulevard, Long Island City, New York.

Landis, Walter S.
Vice President, American Cyanamid Company, 30 Rockefeller Plaza, New York, N. Y.

Miskel, John J.
Manager, New Products Analysis Department, National Oil Products Company, Harrison, New Jersey.

Patrick, William H.
Development Chemist, American Cyanamid Company, Stamford, Conn.

Reed, Burleigh
Professor of Chemistry, Head of Department, Washburn Municipal University, Topeka, Kansas.

Rust, John B.
Vice President, Montclair Research Corporation, 4 Cherry Street, Montclair, New Jersey.

Wezmar, John
Chemist, E. R. Squibb and Sons, New York, N. Y.

Schaar, Bernard E.
President, Schaar and Company, 754 W. Lexington Street, Chicago, Ill.

For Associate:

Cole, Albert J.
Research Chemist, Triumph Explosives, Inc., Elkton, Maryland.

Goldberg, Joseph M.
Control and Development Chemist, Molnar Laboratories, 211 East 19th Street, New York, N. Y.

For Junior:

DiMatteo, Eliseo A.
Research Chemist, Aerovox Corporation, 741 Belleville Avenue, New Bedford, Mass.

Ely, Robert E.
Chemical Engineer, Galigher Company, 228 So. West Temple Street, Salt Lake City, Utah.

Smith, Merton B.
Chemist, Johns-Manville Company, Manville, New Jersey.

To be Reinstated to Fellow:

Berl, Ernst
Research Professor, Carnegie Institute of Technology, Pittsburgh, Pa.

To be raised from Associate to Fellow:

Doede, Clinton M.
Vice President, Connecticut Hard Rubber Company, New Haven, Conn.

To be Raised from Junior to Associate:

Brown, Alfred E.
Assistant Chemist, Eastern Regional Research Laboratory, U. S. Department of Agriculture, Chestnut Hill Station, Philadelphia, Penna.

Kuti, Albert J.
Chemist, Westinghouse Electric and Manufacturing Co., Sharpsville Avenue, Sharon, Penna.

Meeting Dates—1942

Nov. 16-18—American Institute of Chemical Engineers. Netherland Plaza Hotel, Cincinnati, Ohio.

Nov. 20—Dinner in honor of Professor Vladimir N. Ipatieff, on the occasion of his seventy-fifth birthday, given by the Chicago Chapter of THE AMERICAN INSTITUTE OF CHEMISTS. Chicago, Illinois. Speakers: Dr. Frank C. Whitmore and Dr. Ward Evans.

Nov. 24-29—American Chemical Society. National Chemical Exposition and National Industrial Chemical Conference. Sherman Hotel, Chicago, Illinois.

Nov. 30—Dec. 4—National Exposition of Power and Mechanical Engineering. Madison Square Garden, New York, N. Y.

Dec. 4—Meeting of Society of Chemical Industry. Details to be announced.

Dec. 11—Meeting of National Council of THE AMERICAN INSTITUTE OF CHEMISTS.

Dec. 28-29—American Chemical Society. Chemical Engineering Symposium, Palmer House, Chicago, Ill. "The Application of Kinetics to Design and Operation of Chemical Engineering Equipment. Ninth Annual Symposium.

Dec. 29-30—American Science Teachers' Association. Hotel Pennsylvania, New York, N. Y.

Meeting Dates—1943

Jan. 8—Perkin Medal Award to Dr. Robert E. Wilson. Joint meeting of Society of Chemical Industry with American Chemical Society, American Institute of Chemical Engineers, the Electrochemical Society, and the Société de Chimie Industrielle.

Feb. 19—Meeting of Society of Chemical Industry. Details to be announced.

March 5—Meeting of Society of Chemical Industry with American Chemical Society. Presentation of William H. Nichols Medal by American Chemical Society.

April 12-16—American Chemical Society. 105th Meeting. Indianapolis, Indiana.

Sept. 6-10—American Chemical Society. 106th Meeting. Minneapolis, Minnesota.

Dec. 28-30—American Chemical Society. Organic Chemistry Symposium. Boston, Mass. Tenth National Symposium.

The office of War Information announces that the fall edition of the "United States Government Manual" is now available. This is a seven-hundred page reference book on the creation and organization functions of the Federal Departments and Agencies. It contains a list of principal officials, emergency war agencies, organization charts, publications, and an appendix on agencies abolished, transferred, or consolidated since 1933. This manual may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., at $1.00 per copy. Subscriptions covering the three editions a year cost $2.75.

CHAPTERS

Chicago

Chairman, Vanderveer Voorhees *Vice-chairman,* Hilton I. Jones
Secretary-treasurer, Charles L. Thomas
Universal Oil Products Company
Riverside, Illinois.

The date of the banquet to be given by the Chicago Chapter to Professor Vladimir Nikolaevich Ipatieff, on the occasion of his seventy-fifth birthday, has been changed from November twenty-first to Friday, November twentieth. Dr. Frank C. Whitmore of Pennsylvania State College will speak on Dr. Ipatieff's scientific work in organic chemistry. Dr. Ward Evans will speak on Dr. Ipatieff's influence at Northwestern University.

New York

Chairman, Elmore H. Northey *Vice-chairman,* Paul J. Witte

Secretary-treasurer, A. Lloyd Taylor
Oakite Products Company, 22 Thames Street
New York, N. Y.

Council Representative, Marston L. Hamlin

A dinner in honor of Dr. Gustav Egloff was given by the New York Chapter on Friday, October twenty-third at The Chemists' Club, New York, N. Y. Papers read at this meeting appear in this issue of THE CHEMIST.

Niagara

Chairman, L. M. Lawton *Vice-Chairman,* George W. Fiero

Secretary, Margaret C. Swisher

Department of Chemistry
University of Buffalo
Buffalo, New York

Council Representative, Arthur W. Burwell
Carl H. Rasch, *Alternate*

Pennsylvania

Chairman, J. M. McIlvain *Vice-chairman,* Maurice L. Moore

Secretary-treasurer, Clinton W. MacMullen

6650 Large Street

Philadelphia, Penna.

Council Representative, Gilbert E. Seil

News Reporter to THE CHEMIST, Kenneth A. Shull

Washington

President, L. F. Rader, Jr.

Vice-president, Donald H. Andrews *Treasurer,* L. R. Heiss

Secretary, Ernest J. Umberger

207 Albany Avenue, Takoma Park, Maryland

News Reporter to THE CHEMIST, T. H. Tremearne

Council Representative, Albin H. Warth

A dinner for members and guests of the Washington Chapter was held at the Club Studio in The Fairfax Hotel on Friday evening, October ninth.

As everything was informal, no regular order of business was followed. Chapter President, L. F. Rader, Jr., called on Frank Lundstrom to give us news of the membership and chapter organization drive of the INSTITUTE.

President Rader then introduced the speaker of the evening, Colonel M. B. Chittic, chief, Engineering Branch, Chemical Warfare Service, War Department, Washington, D. C. Col. Chittic briefly traced the use of chemicals or smokes from the days of Ghengis Khan to the present war. In respect for the Colonel's very fine presentation of the chemical warfare work and without divulging any information that might be considered confidential or helpful to the enemy, your reporter will not attempt to detail the things discussed.

The Chapter is indebted to Colonel Chittic for clearing up some general questions which many members, who are air wardens, auxiliary firemen and policemen and also serving on decontamination squads, had never fully understood.

Many of the members and guests gathered for informal visits with Colonel and Mrs. Chittic after the meeting was adjourned, and then left for home, evidently satisfied that the effort to attend the meeting during these strenuous times had been well repaid by a good dinner, excellent guest speaker, and pleasant visit.

The enlistment of two of our active members was announced. Dr. Martin Leatherman is now Captain Leatherman, of the Quartermaster Corps, Jeffersonville, Indiana. Kenneth V. Zahn is Lieutenant Zahn, j.g., Naval Training Station, Cornell University, Ithaca, New York.

Gordon M. Kline, F.A.I.C., chief of the Organic Plastics Section, National Bureau of Standards, and technical editor of *Modern Plastics*, recently returned from Great Britain where he spent a month observing developments in war applications of plastics. During his visit he was a guest speaker at luncheon meetings of the British Plastics Federation and the Plastics Group of the Society of the Chemical Industry, and the annual meeting of the Institute of the Plastics Industry in London. Dr. Kline made the trip as a representative of the U. S. Government in response to an invitation from the British Ministry of Supply. He visited the various Government laboratories concerned with plastics and many of the British plastic plants.

Perkin Medal Award

Dr. Robert E. Wilson has been selected by the Society of Chemical Industry to receive the Perkin Medal for 1943. This medal is awarded annually for outstanding work in applied chemistry.

Dr. Wilson is President of the Pan American Petroleum and Transport Company, The American Oil Company, and other subsidiaries. He is a member of the Petroleum War Council and Chairman of the Council's Committee on Petroleum Economics. He is also one of the four managing directors of the General Aniline and Film Corporation recently taken over from German ownership. Outstanding achievements have been made in the development of refining processes under his direction.

Ernest Scheller, F.A.I.C., is now assistant to the president and general manager of the Foil Division of Reynolds Metal Company, Louisville, Ky.

The War Production Board announces that a committee of engineers and scientists has been appointed to define the scope, functions and method of operations which the projected Office of Technical Development should have. The chairman of the new committee is Webster N. Jones, director of the College of Engineering, Carnegie Institute of Technology at Pittsburgh. Other members are: Dr. Lawrence W. Bass, F.A.I.C., director of research, New England Industrial Research Foundation, Boston; Dr. Oliver E. Buckley, president, Bell Telephone Laboratories, New York; Col. Clarence E. Davies, Ordnance Department, U. S. Army, Washington, D. C.; Dr. Ray P. Dinsmore, F.A.I.C., Manager, Development Department, The Goodyear Tire and Rubber Company, Akron, Ohio; Admiral J. A. Furer, U. S. Navy, Washington, D. C.; Dr. Jerome C. Hunsaker, head of the Departments of Mechanical and Aeronautical Engineering, Massachusetts Institute of Technology; H. W. Graham, director of Metallurgy and Research, Jones and Laughlin Steel Corporation, Pittsburgh; and S. D. Kirkpatrick, editor of *Chemical and Metallurgical Engineering*, New York.

President Gustav Egloff was elected to Honorary Membership in the Chemical, Metallurgical, and Mining Society of South Africa, at a meeting of its Council held on August 7, 1942, in Johannesburg.

Robert J. Moore, F.A.I.C., delivered an address on "Plastics in Textiles" before a meeting of the American Association of Textile Technologists in New York, N. Y., on November fourth.

NEW BOOKS

Rubber and its Use

HARRY L. FISHER

$2.25

An authoritative and practical treatment. Rubber cultivation as well as development of synthetic rubber compounds. Dr. Fisher received the 1940 Modern Pioneer Award and is president of American Institute of Chemists.

Chemical Warfare

CURT WACHTEL

$4.00

Various types of lethal gases, their development—evaluation and toxicity, as well as treatment, and psychological aspects, etc.

Fluorescent Light & Its Application

H. C. DAKE — JACK DE MENT

$3.00

Latest developments in ultra-violet radiations and uses of ultra-violet light—including chapters on radioactive minerals, etc.

The Cyclotron

W. B. MANN

$1.50

The description of the cyclotron as a source of protons, deuterons, neutrons and the L-particles. Theoretical, mathematical and mechanical aspects.

Forensic Chemistry

HENRY T. RHODES

$5.00

Chemical methods for the use of the criminologist in identification, proof of corpus delicti, counterfeiting—toxic agents —firearms stains.

Anodic Oxidation of Aluminum and its Alloys

DR. A. JENNY

$6.50

A general survey of the electrolytic behavior of aluminum alloys at the anode.

Electrochemistry and Electrochemical Analysis

Vol. I—Electrochemical Theory

H. J. S. SAND

$2.00

Contents—Theories of inter-tonic attraction—Liquio junction potentials—Electrode potentials of half cells—Irreversible Electrolytic processes polarization—et al.

Electrochemistry and Electrochemical Analysis

Vol. II—Gravimetric Electrolytic Analysis and Electrolytic Marsh Tests

H. J. S. SAND

$2.00

Contents—Apparatus and technique of electrolytic deposition—Quantitative disposition and separation of individual metals —Applications to the analysis of industrial alloys—Electrolytic micro-analysis.

Distributed by

THE CHEMIST

233 Broadway New York, N. Y.

MAKE SURE

YOU KNOW the important developments and latest procedures in

HEAT TRANSMISSION

Out of the vast research and progress made recently in the broad field of heat transmission this new book brings practicing engineers a full, analytical, handy presentation of the most important developments and improved methods. Threefold in its purpose, it analyzes the new data on heat in light of the basic mechanisms by which heat is transferred, presents the recommended relations in the form of equations or graphs, and illustrates the method of attack on new problems.

JUST OUT! ***Revised 2nd Edition***

HEAT TRANSMISSION

By W. H. McAdams, Professor, Chemical Engineering, Massachusetts Institute of Technology. 459 pages, 6 x 9, 198 illustrations, many tables, $4.50.

COVERS:

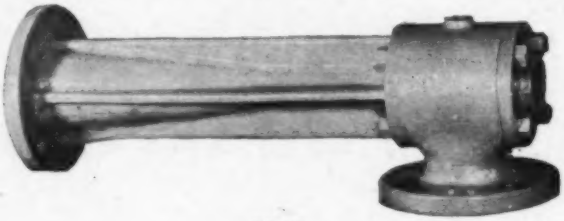
Introduction
Conduction
Heating and Cooling of Solids
Radiant Heat Transmission
Dimensional Analysis
Flow of Fluids
Introduction to Heat Transfer between Fluids and Solids
Heating and Cooling Fluids Inside Tubes
Heating and Cooling Fluids Outside Tubes
Condensing Vapors
Heat Transfer to Boiling Liquids
Applications of Design

SPONSORED by the Committee on Heat Transmission, National Research Council, this improved edition is a comprehensive treatise on the various fields of heat transmission, containing authoritative correlations for the various important cases of heat transfer, with numerous examples of the application of the recommended relations.

Reliable data from diverse sources, including much unpublished material have been reduced to a common basis for purposes of comparison and have been correlated in the light of the most helpful theoretical analyses. The results of these critical studies are presented as formulas and graphs carefully constructed to give weight to all the data and at the same time make the results readily available for use in engineering design.

Copies may be obtained from
THE CHEMIST
233 Broadway, New York, N. Y.

STEAM JET EVACTORS



Aiding

NATIONAL DEFENSE

Numerous Croll-Reynolds Evactors are working overtime maintaining high vacuum in plants making explosives, synthetic rubber, airplane lubricants and a long list of other ordnance materials. They are maintaining high vacuum on engines and turbines of dozens of American ships sailing the seven seas.

While the large and special units require up to three months or more for fabrication the smaller ones are sometimes made in two weeks, or less, when the demand is urgent. These include single and multi-stage units for vacuum up to a small fraction of 1mm. absolute, also small condensers and vacuum chilling equipment.

A recent development is a vacuum-cooled condenser for maintaining condensing temperatures down to 34° F. Inquiries will be handled as promptly as possible under the circumstances.

CROLL-REYNOLDS CO.

ESTABLISHED 1917

17 JOHN STREET NEW YORK, N. Y.